

RECEIVED
CENTRAL FAX CENTER
OCT 19 2006

REMARKS

1. Summary of Office Action

In the Office Action mailed on June 19, 2006, the Examiner rejected claims 1, 2-6, 22, and 23 under 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Further, the Examiner rejected claims 1, 2, 22, and 23 under 35 U.S.C. § 102(e) as being allegedly anticipated by U.S. Patent Application Pub. No. 2004/0208596A1 (Bringans). In addition, the Examiner rejected claims 3-6 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Bringans in view of U.S. Patent Application Pub. No. 6660988B2 (Lee).

2. Status of the Claims

By this response, Applicants have amended claims 1, 3, 5, and 23. Further, Applicants have cancelled claims 4 and 6. In addition, Applicants have added six new claims, claims 24-29. Now pending in this application are claims 1-3, 5, and 22-29, of which claims 1 and 27 are independent, and the remaining are dependent.

Applicants' invention is generally directed to a laser source detection system and method. As shown in Figure 6, once an incoming laser has been detected at step 602, the system then determines a direction of the incoming laser at step 604. Figure 2 in Applicants' specification shows a lens array 202 containing a plurality of lens array cells 208 in which cells 208 may be moved to detect and determine light entering from different directions.

According to an exemplary embodiment, Figure 3 in Applicants' specification shows an individual cell 300 containing a microlens 308 that may be moved along the x and y axes by comb drives 316b and 314a respectively. Applicants' specification explains that "as the microlens 308 is moved along the x- and y-axes, the light detector will be best able to determine

intensity, which, in some embodiments, is used to determine the location of the source, as described in further detail below.” (See Applicants’ specification, page 13, lines 7-10). Further, Applicants’ specification explains that “[i]n determining the lens location at which the strongest energy is detected, four samples are preferably taken for each cell 300 to determine a vector toward the center of the laser energy seen by the cell 300.” *Id.* at page 13, lines 20-22. Applicants’ specification continues to explain that “[i]n addition, the algorithms for determining lens position, calculating vectors for determining strongest energy locations, and determining the source of incoming light are preferably done in hardware to achieve faster and more robust results.” *Id.* at page 14, lines 5-8.

In this regard, Applicants’ independent claim 1, as amended, recites a system for determining a direction of incoming light in which actuators are operable to vary the intensity of incoming light by displacing individual lenses and in which a processor determines the direction of incoming light based on the detected light intensity and the lens displacement. In particular, Applicants’ independent claim 1 recites a processor in “communication with the actuators to individually displace the lenses to vary the intensity of incoming light detected at the light detectors, wherein the processor determines the direction of incoming light based on the light intensity detected at one or more light detectors and the lens displacement of one or more lenses directing light at one or more light detectors.”

3. Response to Rejections

a. Response to 35 U.S.C. § 112 Rejection of Claim 1, 2, 22, and 23

As noted above, the Examiner rejected independent claim 1 under 35 U.S.C. § 112, second paragraph, as being “indefinite for failing to particularly point out and distinctly claim the

subject matter which applicant regards as the invention.” (See Office Action mailed on June 19, 2006 at page 2).

Applicants respectfully traverse the 35 U.S.C. § 112 rejection. Applicants’ invention is generally directed to a laser detection system that may be used, for example, in the context of military applications in which the light source could originate from a friend or an enemy. As an example, Applicants’ specification explains that the laser detection system may be placed on military vehicles, as shown in Figure 4A and/or 4B. Instead, and/or in addition, as shown in Figure 5, the laser detection system may be placed on military personnel 500 and/or 550. Applicant’s specification states that “[i]n a preferred embodiment, the system is implemented as a ‘patch’ attached to a soldier or vehicle.” *Id.* at page 16, lines 9-10. The “patch”, as shown in Figure 6, may be used to determine a direction of incoming laser light (step 604) and/or also determine whether incoming light from the laser is from a friend or an enemy (step 606).

According to the context in which the detection system is being used, it logically follows that the system for determining a direction of incoming light should be able to determine whether the incoming light is from a friend or enemy without revealing the detection system’s location. Thus, according to the exemplary embodiments presented in Applicants’ specification, it logically follows that the light source from which the incoming originates, is external to and independently operable from the system that is used to detect a direction of incoming light.

In this regard, Applicants’ new dependent claim 24 recites a system wherein the incoming light originates from a remote laser source that is external to and independently operable to the system for detecting the direction of incoming light.

Further, Applicants’ dependent claim 25 recites that the system for “determining the direction of incoming light is used to detect a location of a source of the incoming light” and

independent claim 27 recites a system for determining a location of a source of incoming light in which a processor "receives an indication from the energy detected from the at least one light detector and positions the at least one lens to increase the detected energy to assist in determining the location of the source of incoming light." Applicants provide the following discussion to show support for these newly added claims.

On page 5, lines 5-7, Applicants' specification states that "[b]y positioning the individual lenses in the array to maximize the energy on their detectors, the approximate location of the laser source may be determined." The system for detecting incoming light, in a preferred embodiment, may include "tens of thousands of cells 300 in each array". *Id.* at page 15, lines 3-4. Applicants' specification explains that by receiving communications corresponding to many cells, a processor can assist in determining the approximate location of a light source. *Id.* at page 14, lines 19-20. In one embodiment, each processor may store a table. An exemplary table, such as Table A, on page 15 of Applicants' specification, is included below.

TABLE A.

NODE	ENERGY SEEN	LOCATION	WHEN
425	1020	45.367° 121.24M	12:00 01.0035
431	1044	45.380° 121.25M	12:00 01.0102
418	989	45.388° 121.24M	12:00 01.0199
.

For the above reasons, Applicants respectfully traverse the 35 U.S.C. § 112 rejection.

b. Response to 35 U.S.C. § 102(e) Rejection of Claims 1, 2, 22, and 23

As noted above, in the Office Action mailed June 19, 2006, the Examiner rejected claims 1, 2, 22, and 23 under 35 U.S.C. § 102(e) as being anticipated by Bringans. Of these claims, claim 1 is independent and the remaining claims are dependent.

For a reference to anticipate a claim, the cited reference must teach each and every element of the claim. MPEP § 2131. Applicants respectfully traverse the rejection of claims 1, 2, 22, and 23, as amended, because Bringans fails to teach a system for determining a direction of incoming light in which actuators are operable to vary the intensity of incoming light by displacing individual lenses and in which a processor determines the direction of incoming light based on the detected light intensity and the lens displacement.

Rather, Bringans is directed to an optical communication apparatus in which two (or more) subsystems optically communicate with each other by aligning "one or more light sources associated with one subsystem with detectors associated with the second subsystem." (*See* Bringans, at para. 0025). According to Bringans, "aligning the light source (emitter) and a target (receiver) across a free space separating the emitter and receiver involves moving a microlens through a predefined series of positions relative to the emitter and generating a light beam at each position such that the resulting series of light signals are transmitted over a wide area surrounding the receiver." *Id.* at para. 0009. The optimal microlens position is determined by measuring the strength of the detected light beam at each predefined position, and then locking the microlens at the position at which the strongest beam was detected. *Id.* at para. 0007-0009.

In paragraph 0032, Bringans' states "[r]eferring to the right side of FIG. 2, receiver array 180 includes a series of receivers (e.g., photodetectors) 185 that are arranged in a pattern (e.g., a straight line) such that each receiver 185 is capable of receiving a *corresponding light signal*

157 generated by a corresponding emitter 165 and directed by a corresponding microlens 175." (Emphasis added.) Bringans' method of aligning a receiver with a corresponding emitter such that there is a one-to-one correspondence between emitters and receivers is also discussed in Bringans' Figure 10.

In paragraph 0056, regarding Figure 10, Bringans states that:

FIG. 10 is a simplified perspective view showing a portion of a free space optical interconnect apparatus 150-4 according to yet another alternative embodiment of the present invention. Instead of a single row of emitters and associated microlenses, interconnect apparatus 150-4 includes an emitter array 160-4 and *matching microlens assembly 170-4 in which emitters 165-4 and microlenses 175-4 are arranged in a matrix pattern (i.e., several rows) such that each microlens 175-4 is positioned to receive light signals emitted from an associated emitter 165-4. A corresponding receiver array (not shown) includes receivers arranged in the same matrix pattern as that of emitters 165-4 and microlenses 175-4.* (Emphasis added.)

Further, in paragraph 0053, Bringans states that:

Although the present invention has been described with respect to certain specific embodiments, the inventive features of the present invention are applicable to other embodiments as well. For example, more than one microlens assembly may be utilized to direct light beams to *corresponding* receivers, as suggested in the alternative embodiments described below with reference to FIGS. 8 and 9. (Emphasis added.)

Bringans, however, does not teach a system for determining a direction of incoming light in which actuators are operable to vary the intensity of incoming light by displacing individual lenses and in which a processor is able to determine the direction of incoming light based on the detected light intensity and the lens displacement. Rather, as noted above, according to Bringans' disclosure, a microlens is moved to different positions to align a receiver with a corresponding emitter so that the strongest beam may be used for communication. Applicants submit that there is no discussion in Bringans of determining a direction of incoming light based on detected light intensity and the lens displacement.

On page 3 of the Office Action, while rejecting independent claim 1, stated that "120, a separate system from the light detecting system 130". In fact, according to Bringans' disclosure, 120 and 130 are *subsystems* of system 100. See Bringans, at paragraph 0027 and Figure 1 (Emphasis added). Further, as shown in Figure 5, the two subsystems 120 and 130 function cooperatively to align the receiver with a corresponding emitter.

Figure 5 show three systems: system CPU 110, subsystem 120, and subsystem 130. According to Figure 5, system CPU 110 transmits a start command (block 505) to subsystem 120 and subsystem 130. A beam is transmitted from subsystem 120 (block 515) to subsystem 130 (block 525). The beam strength is measured and transmitted to system CPU 110 (block 525 to block 535). According to Bringans' method, a determination is made of whether the transmitted beam at the current position of the microlens support has the strongest beam strength (block 537). If the determination is that the beam transmitted from subsystem 120 to subsystem 130 was not the strongest beam then the beam strength at the next position of the microlens support is considered (block 540). This process repeats until all of the predefined positions are considered and strongest beam position has been determined. *Id* at paras. 0043-0046.

Bringans' disclosure of two subsystems functioning cooperatively to move a microlens such that the strongest beam can used for optical communication does not amount to Applicants' claimed system in which actuators operate to vary the intensity of incoming light by displacing individual lenses and in which a processor determines the direction of incoming light based on the detected light intensity and lens displacement.

Thus, the Office Action has failed to establish that Bringans teaches a system for determining a direction of light by varying the intensity of incoming light detected by the light detectors as required by Applicants' independent claim 1. Consequently, Bringans does not

anticipate any of these claims. Each of claims 2-6 and 22-26 depends from, and thus incorporates all of the limitations of, one of these independent claims. Thus, for at least the same reason, Bringans also does not anticipate any of these dependent claims.

c. Response to 35 U.S.C. § 103(a) Rejection of Claims 3-6

As noted above, the Examiner rejected claims 3-6 under 35 U.S.C. § 103(a) as being obvious over a combination of Bringans and Lee. Applicants submit the following:

i) No Motivation to Combine

According to M.P.E.P. § 2143, in order to establish the required *prima facie* case of obviousness of a claimed invention by applying a combination of references, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *See* M.P.E.P. § 2143.

As noted above, Bringans is directed to an optical communication system in which two subsystems communicate with each other by aligning a receiver with a corresponding emitter by moving an array of microlenses to provide the strongest beam strength. (*See* Bringans, at paras. 0007-0009). Lee, however, teaches a method of fabricating Focal Plane Arrays (FPAs) in which lenses are fabricated to have a certain predefined shape. According to Lee, the shaped lenses focus light to the best operable detector in each pixel. In column 1, lines 59-63, Lee states:

Since FPAs are generally tested before the fabrication of the microlens array, the operability of each detector can be evaluated, and a file generated specifying detector operability for each pixel. According to one embodiment, this file is used to generate a custom gray-scale microlens mask *for fabricating the array using photolithography, in which the shape of the lens for each pixel is chosen to direct the lens focus spot to the*

best detector in each pixel. The better detector is similarly selected for readout by the MUX while the other detectors are not selected. (Emphasis added.)

As such, Lee is directed to fabricating a "custom microlens array" that is used to exclude inoperable detectors. *Id.* at column 2, lines 39-40. For example, Figure 4 in Lee shows lenses 410, 412, 414, and 416 and detectors 420, 422, 424, 426, 428, 430, 432, and 434. As shown in Figure 4, each of the lenses are fabricated to have a certain shape such that lens 410 directs light to detector 422, lens 412 directs light to detector 424, lens 414 directs light to detector 430, and lens 416 directs light to detector 434. *Id.* at Figure 4 and column 5, lines 13 to 20. In this way, Lee is able to exclude detectors 420, 426, 428, and 432.

Applicants find no discussion in Lee that the lenses are individually positionable after they have been fabricated. In fact, Lee's method of fabricating lenses to a predefined shape so that each lens can focus light to the best detector in each pixel clearly suggests that the lenses, once fabricated to have a predefined shape, can only direct light in a certain direction.

Bringans, however, as noted above, is directed to a system in which the lenses are moved to align a receiver with a corresponding emitter. Applicants' submit that one of ordinary skill in the art would not have been motivated to combine Lee's method of fabricating an array of lenses in which the lenses for each pixel are designed to have a predefined shape with Bringans' steerable free space optical interconnect system that allows for receivers to be aligned with corresponding emitters.

ii) References Do Not Include All the Claim Elements

Even if the combination of references as set forth by the Examiner is appropriate (which Applicants do not concede), neither of the references teach a system for determining a direction of incoming light comprising a processor that is in communication with the actuators that are operable to individually displace the lenses to vary the intensity of incoming light detected at the

light detectors, wherein the processor determines the direction of incoming light based on the detected light and the lens displacement.

Under M.P.E.P. § 2143, in order to establish a *prima facie* case of obviousness of a claim over a combination of references, the Examiner must establish that the combination discloses or suggests every element recited in the claim. Applicants respectfully traverse the rejections of claims 3-6 because the combination of Bringans and Lee fails to disclose or suggest the invention as a whole as recited in any one of these claims.

Claims 3-6 all ultimately depend on claim 1 and thus include all of the limitations of amended claim 1. For the reasons set forth above, Applicants submit that Bringans fails to teach a system for determining a direction of incoming light in which a processor is in communication with the actuators for individually displacing the lenses to vary the intensity of incoming light detected at the light detectors and determines the direction of incoming light based on the detected light and the lens displacement. In this regard, Bringans fails to teach the limitation of claim 1. Thus, Bringans also fails to teach the limitations of dependent claims 3-6.

Further, Applicants submit that Lee fails to make up for the deficiency of Bringans. Lee is directed to a method of fabricating Focal Plane Arrays (FPAs). (See, Lee, column 2, lines 30-40). In particular, Lee is directed to fabricating lenses that have a certain shape which allows for light to be focused on the best detector in each pixel. Lee's system in which lenses are fabricated to have a certain shape does not amount to a system for determining a direction of light by varying the intensity of incoming light detected by the light detectors. Consequently, the combination of Bringans and Lee fails to disclose or suggest all of the limitations of claims 3-6, and thus a *prima facie* case for claims 3-6 has not been made.

4. Conclusion


For the foregoing reasons, Applicants submit that all of the pending claims are now in condition for allowance. Applicants, therefore, respectfully request favorable reconsideration and allowance. Should the Examiner wish to discuss this case with the undersigned, the Examiner is welcome to call the undersigned at (312) 913-3351.

Respectfully submitted,

**MCDONNELL BOEHNEN
HULBERT & BERGHOFF LLP**

Date: October 19, 2006

By:


Omar D. Galaria
Reg. No. 59,207